ARIZONA GAME AND FISH DEPARTMENT
HABITAT PARTNERSHIP COMMITTEE
HABITAT ENHANCEMENT AND WILDLIFE MANAGEMENT PROPOSAL

Game Branch / HPC Project Number:	12-702

PROJECT INFORMATION

Project Title: Management Focus Area Database Development

Region and Game Management Unit: N/A

Local Habitat Partnership Committee (LHPC):	**Was the project presented to the LHPC?**
• None	**YES**[] **NO**[X]

Has this project been submitted in previous years? **YES**[] **NO**[X]
If Yes, was it funded? **YES**[] **NO**[] → **Funded HPC Project #(s)**: N/A

Project Type: Seasonal Position / Intern for Database Development

Brief Project Summary:
The purpose of this project is the development of the structural database and initial Geographic Information System (GIS) components for the Management Focus Areas (MFAs) to be developed under the Arizona Game and Fish Department's (Department) Comprehensive Game Management Plan (CGMP).

Big Game Wildlife Species to Benefit: Bighorn Sheep, Black Bear, Buffalo, Elk, Javelina, Mountain Lion, Mule Deer, Pronghorn Antelope, Wild Turkey, and Whitetail Deer.

Implementation Schedule (Month/Day/Year):

Project Start Date:
October 1, 2012

Project End Date:
August 15, 2013

Environmental Compliance:
NEPA Completed: Yes[] No[] N/A[X]
Projected Completion Date: _____

State Historic Preservation Office - Archaeological Clearance:
Yes[] No[] N/A[X]
Projected Completion Date: _____

Arizona Game and Fish Department EA Checklist: N/A[X]
To be Completed by: _____
Projected Completion Date: _____

PROJECT FUNDING

Special Big Game License Tag Funds Requested:	**$** 10,000
Cost Share or Matching Funds:	**$**
Total Project Costs:	**$ 10,000**

PARTICIPANT INFORMATION

Applicant (please print):	**Address**:	**E-mail**:
Brian Wakeling, Game Branch Chief	5000 W. Carefree Highway	BWakeling@azgfd.gov
Telephone: 623-236-7385		**Date**: August 31, 2012

AGFD Contact and Phone No. (If applicant is not AGFD personnel):
N/A

Project has been coordinated with:
Regions I-VI, State Habitat Partnership Committee, Wildlife Conservation Organizations participating in the HPC process.

NEED STATEMENT – PROBLEM ANALYSIS:
Development of the Department's CGMP will provide a mechanism for delineating and implementing improvements with regards to the management of the state's game animals and their habitats. The CGMP vision is to develop a web-based tool that links existing big game species management plans, and to allow the layering of visual data elements like roads, development pathways, wildlife linkage corridors, habitat areas of critical species, and other GIS data that have an influence on Arizona's natural resources and wildlife. This web-based tool will also give wildlife biologists and managers a holistic view to make better decisions to protect, restore, and manage game populations.

The CGMP is composed of two main components:

- Species-specific Planning and Management
    - The Species-specific approach references existing plans, species guidelines, and conservation strategies, as well as identifies statewide issues, opportunities, concerns, and threats.

- Management Focus Area Planning and Management
    - The MFA approach focuses on an array of management objectives for a geographic area, typically consisting of one or more Game Management Units (GMUs). The MFAs are analyzed for the combined management needs and actions of big and small game species, migratory birds, predators, and furbearers. The MFAs also serve to capitalize on opportunities, mitigate threats or weaknesses, and identify impediments, through habitat management projects, game management activities, collaboration, data management, and outreach planning.

PROJECT OBJECTIVES:
The purpose of this project is hire a qualified intern to develop the structural database and initial Geographic Information System (GIS) components; and gather and organize existing data, reports, and game species management resources for the MFAs identified within Regions I-VI. The State HPC discussed this at their June 2012 meeting and there appeared to be general, if unofficial support for this idea. As an enhancement project, this would allow the Department to hire a person whose entire job focus would be the development of this database.

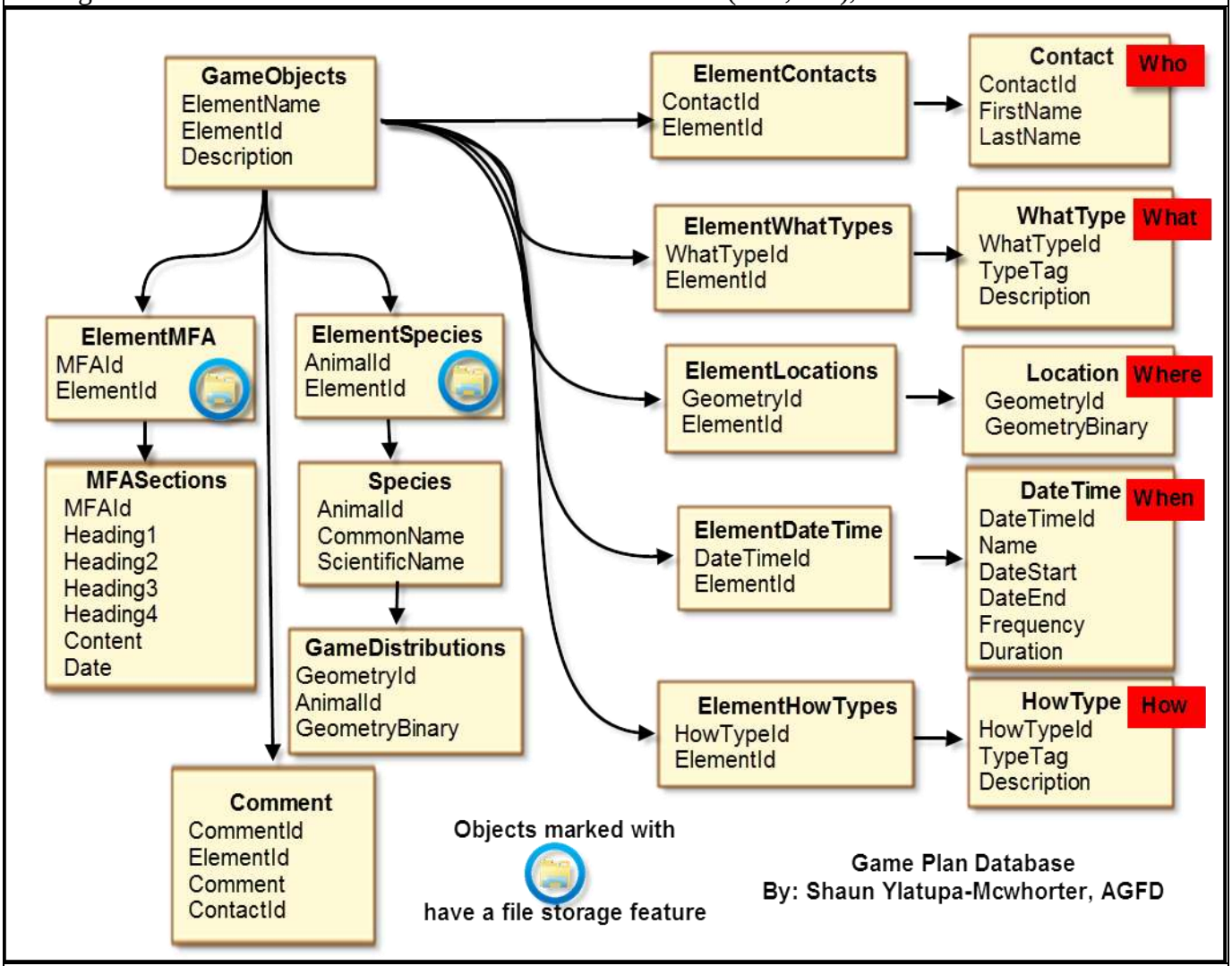
PROJECT DESCRIPTION AND STRATEGIES:
With respect to management of game animals, the questions of: what is happening; who is performing this action; where is it occurring; when does it occur; what is its frequency; and is it an opportunity/threat or weakness/strength; attempt to capture segments of the required biologic and social observations that form the basis for improving overall habitat and wildlife management goals. With the ability to collect and organize this type of data we can capture more quantitative and specific information to build out a 'GamePlan' database and a CGMP tool website so the information going in and out is standardized and retrieved in a meaningful way. The design is done in such a way as to adapt to the data storage needs of the user and allow for the sharing of information.

To implement such a conceptually large set of objectives, the highest priority will be to determine the structure of the databases that will capture the required information to satisfy generalized goals 1-5 listed below. The addition of tables and structural improvements will be designed and implemented for the conceptual 'GamePlan' database below.

1) Improve the Habitat Management process, responsiveness, and data collection.
2) Improve the Wildlife Management process, responsiveness, and data collection.
3) Improve the Collaboration process, responsiveness, and data collection.
4) Improve the Data Management process, responsiveness, and data collection.
5) Improve the Outreach Planning process, responsiveness, and data collection.

Conceptual Game Planning Database-Table Element View

For the Game Branch to efficiently integrate the Game Plan Database with other department software and information—the tables found in the Game Plan Database will need to be extraordinarily normalized and abstracted. The combined questions of 'Who, What, Where, When, and How' is the essential set of information that any person, place or thing can relate to or do. The table—'MFASections' satisfies the requirement of capturing the sections of a Comprehensive Plan, for any Management Focus Area. Both 'MFASections' and 'Species' are related to a directory on the web server. The 'Species' directory will have folders that will allow the Game Plan Database to link to species plans, species guidelines, and conservation strategies that are stored in Microsoft Office 97-2003 formats (.doc, .xls), or even JPGs and PDFs.



A detailed description of the conceptual 'GamePlan' database and related products is attached to the proposal in Appendix 1.

PROJECT LOCATION:
All project activities will take place within the Department Headquarters or Regional Offices.

LAND OWNERSHIP AT THE PROJECT SITE(S)*:*
(if the project area is private property, please state specifically and provide the landowner's name)

- N/A

IF PRIVATE PROPERTY, IS THERE A COOPERATIVE BIG GAME STEWARDSHIP or LANDOWNER AGREEMENT BETWEEN THE LANDOWNER AND THE DEPARTMENT?
YES[] NO[] N/A[X]

HABITAT DESCRIPTION:
N/A

ITEMIZED USE OF FUNDS:

Special Big Game License Tag Funds
Seasonal Position/Intern not to exceed 1500 hours per calendar year (approximately19 pay periods at 40 hours/pay period):

- $12.60/hour x 80hours/month x 10 months = **$10,080**

Funding request is $1,000 from each of the 10 big game species tag fund accounts.

Cost Share or Matching Funds (*for volunteer labor rates please refer to the worksheet below*)

LIST COOPERATORS AND DESCRIBE POTENTIAL PARTICIPATION:

WOULD IMPLEMENTATION OF THIS PROJECT ASSIST IN PROVIDING, MAINTAINING, OR FACILITATING RECREATIONAL ACCESS?
YES[] NO[] N/A[X]

PROJECT MONITORING PLAN:
N/A

PROJECT MAINTENANCE:
The operation and maintenance of each MFA database and associated files will be the responsibility of the Regional Game Specialist where the MFA is located.

PROJECT COMPLETION REPORT TO BE FILED BY:
Game Branch - Phoenix Headquarters

WATER DEVELOPMENT PROJECTS (*please use the worksheet below***):**
N/A

TREE CLEARING/REMOVAL PROJECTS (*please use the worksheet below***):**
N/A

APPENDIX 1

Overview:

Synthesized from the Project Description section, here is a list of goals and objectives for the State its AZGFD Regions:

GENERALIZED OBJECTIVES:

1) Capitalize on Opportunities
2) Mitigate threats and weaknesses
3) Identify Impediments

GENERALIZED GOALS:

6) Improve the Habitat Management process, responsiveness, and data collection.
7) Improve the Wildlife Management process, responsiveness, and data collection.
8) Improve the Collaboration process, responsiveness, and data collection.
9) Improve the Data Management process, responsiveness, and data collection.
10) Improve the Outreach Planning process, responsiveness, and data collection.

A list of available tools that can be improved and further developed:

A) Comprehensive Game Management Planning Tool Website ('Website').
    a. The Website is comprised of all the tools that follow.
    b. The Website allows for the accurate and efficient data creation, updating, and sensible reading pagination of the 'GamePlan' Database.
    c. Access to Species and MFA is accessible by viewing the MFA or the record of the species, and vice versa.
    d. Information can be accessed from the Website as pre-compiled files, text on the page, or downloaded from the database.
B) Game Planning Tool Map
    a. This map includes spatial layers that are for internal use only, as well as the layers that are found on HabiMap.
    b. This map has the same look and feel as HabiMap, but can include unique features.
    c. This map will allow for staff to view statewide data layers that support MFA content they require few to no regular changes.
C) Game Planning Tool Data Map
    a. This map will make it possible to add and manipulate the spatial data in the database.
    b. This map has the same web mapping technology being used in many projects—including the AZGFD Dashboard where the HPC Dashboard resides.
    c. This map will have a subset of the layers available on the GPT, however this map will allow to view and add the most current information stored in the GamePlan Database.
D) SQL Server 'GamePlan' Database
    a. Currently holds the information to make the CGMPT Website operate.
E) File Storage System
    a. Currently holds the documents that support the MFAs: BlackMountains, Unit10, Unit33, ect.

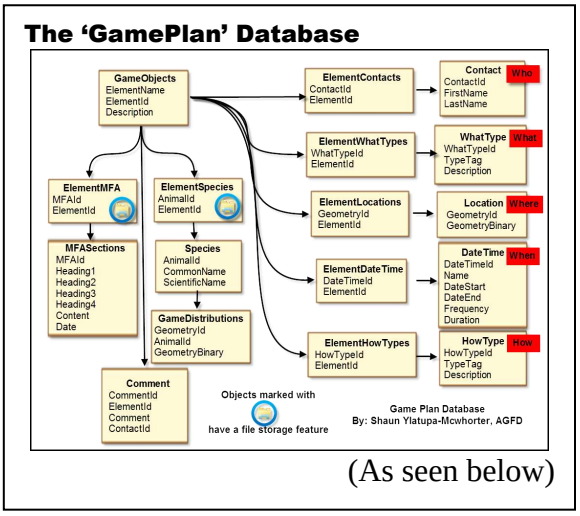
<u>The following describes how the tools (A-E) satifsfy the required objectives (1 through 3):</u>

Logic:

Objectives 1, 2, and 3 can be considered to be very similar in composition. The 3 objectives can be 'boiled down' to these questions: With respect to Game Animals, **what is happening, who is performing this action, where is it occurring, when does it occur, what is its frequency, and is it an opportunity/threat or weakness/strength**? Though this

information is more 'qualitative' and potentially 'generic' it doe's capture the required biologic and social observations that form the basis for improving Habitat and Wildlife Management (Goals: 1,2); the way we will be able to capture more quantitative and specific information will be to build out the 'GamePlan' database and CGMPT Website so the information going in and out is standardized and retrieved in a meaningful way. The design is done in such a way as to adapt to the data storage needs of the user and allow for the sharing of information across knowledge domains (Goals: 3,4). Finally, this Content Management System is accessible to any user who can remote onto the AZGFD_PHX network using the Junos Web Access System and browse to the http://phx-gis-dev-ags/GamePlan Website (Goal 5).

Data: First and foremost, to implement such a conceptually large set of objectives—the highest priority will be to determine the structure of the databases that will capture the required information to satisfy Goals 1-5. The addition of tables and structural improvements will be designed and implemented for the 'GamePlan' database (Tools: D). Please look at **Figure 1** to see the 'GamePlan' Database.



(As seen below)

Questions that we need to capture in the database:

1) **What is happening?**
   1. This is an important question that can have a wide variety of answers, for it can be associated with a person, place, thing, or action (noun and verb). The answers to the 'What' question can vary as much as the answers to the 'How' question, and that is why the two questions will have similar data structures and web applications.
   2. The 'WhatType' table keeps a list of all standardized type of nouns and verbs that describe a 'GamePlan' Database record.
   3. It will be the responsibility of the staff to add to the list they see fit.
2) **Who is performing the action?**
   1. This is conceptually an easy set of data to store—however, the CGMPT Website will need to be built out to handle the authentication of users when adding and updating data.
   2. The 'Contacts' table keeps all information about the people who interact with the data or people who are related to the data—not as a way to log the datas use but to link data to someone who may know more.
3) **Where is it occurring?**
   1. This is an important question because of how much we value spatial information and how much of the information can be tied to something spatial.
   2. Creating, reading, updating, and editing spatial information are unique tasks when compared to textual or number information.
   3. The 'Location' table keeps all the information related to the geometry that comprises points, lines, and polygons.
4) **When does it occur?**
   1. The question of when can be answered in many ways, and given many more qualities. Such as the time period between March 21st and June 21st is called spring, it happens once a year, and will occur until the end of time.
   2. The 'DateTime' table keeps all the information related to the qualities of date and time.

5) **How does it occur?**
   1. The 'How' Question is also associated with the noun or verb of the record element.
   2. The answers to the 'How' question can vary as much as the answers to the 'What' question, and that is why the two questions will have similar data structures and web applications.
   3. The 'HowType' table keeps a list of standardized type of nouns and verbs that describe a GamePlan Database Record.

Table Keys:

In order to allow for the complete re-use and join of every type of information in this database, each table has a Many-to-Many relationship to the 'GameObjects'. What this means, for example, is a plot of land can be associated with multiple GameObject records, a 'GameObject' record can relate to multiple plots of land, a 'GameObject' record may not need contact or location information or any other table, because they are all optional. The Website will allow for the efficient re-use of pre-exsisting records—by linking a 'GameObject' record to the supporting data by using its 'ElementId'.

Figure 1: Game Planning Database-Table Element View

So the Game Branch can efficiently integrate the Game Plan Database with other department software and information—the tables found in the Game Plan Database are extraordinarily normalized and abstracted. The combined questions of 'Who, What, Where, When, and How' is the essential set of information that any person, place or thing can relate to or do. The table—'MFASections' satisfies the requirement of capturing the sections of a Comprehensive Plan, for any Management Focus Area. Both 'MFASections' and 'Species' are related to a directory on the web server. The 'Species' directory will have folders that will allow the Game Plan Database to link to species plans, species guidelines, and conservation strategies that are stored in Microsoft Office 97-2003 formats (.doc, .xls), or even JPGs and PDFs.

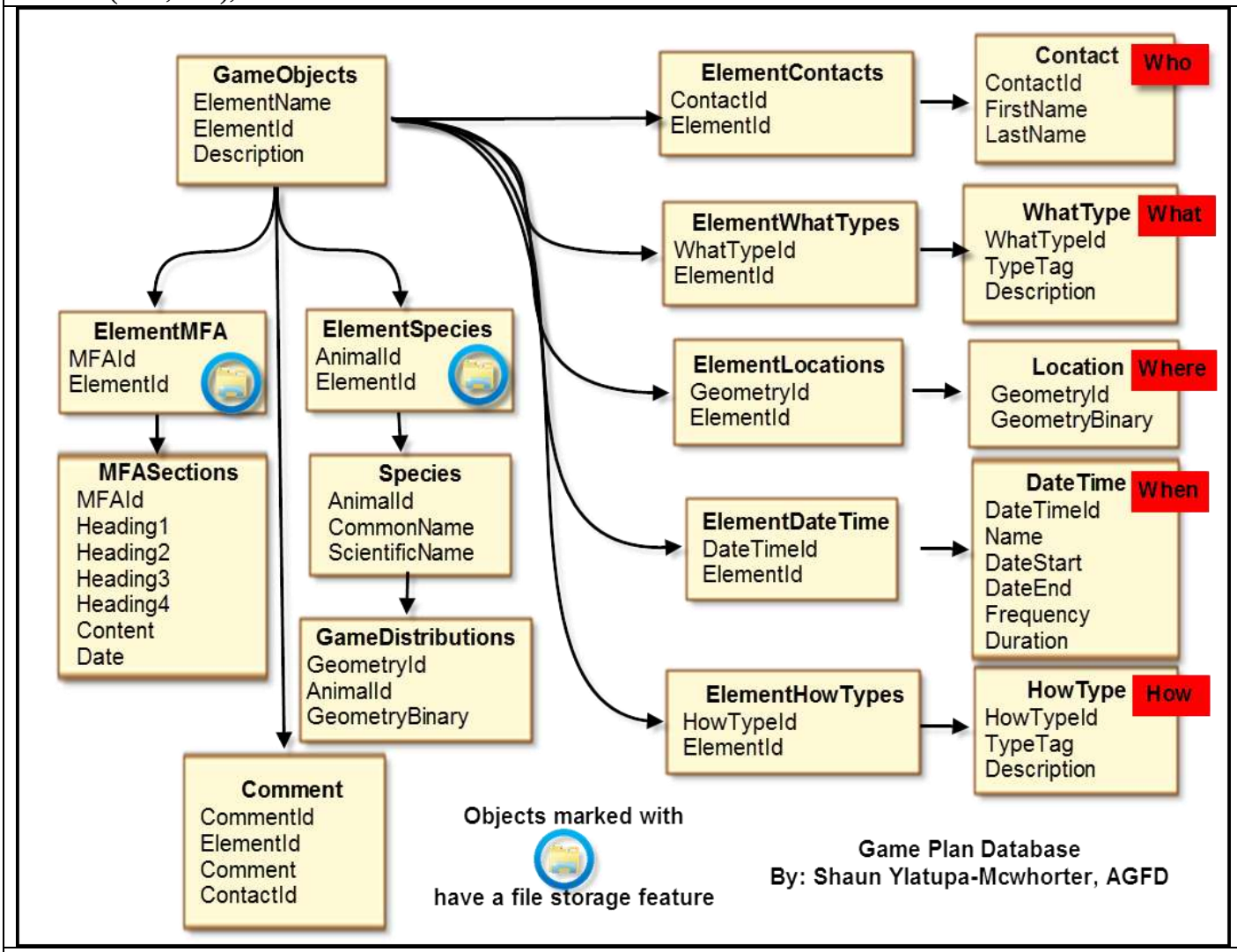
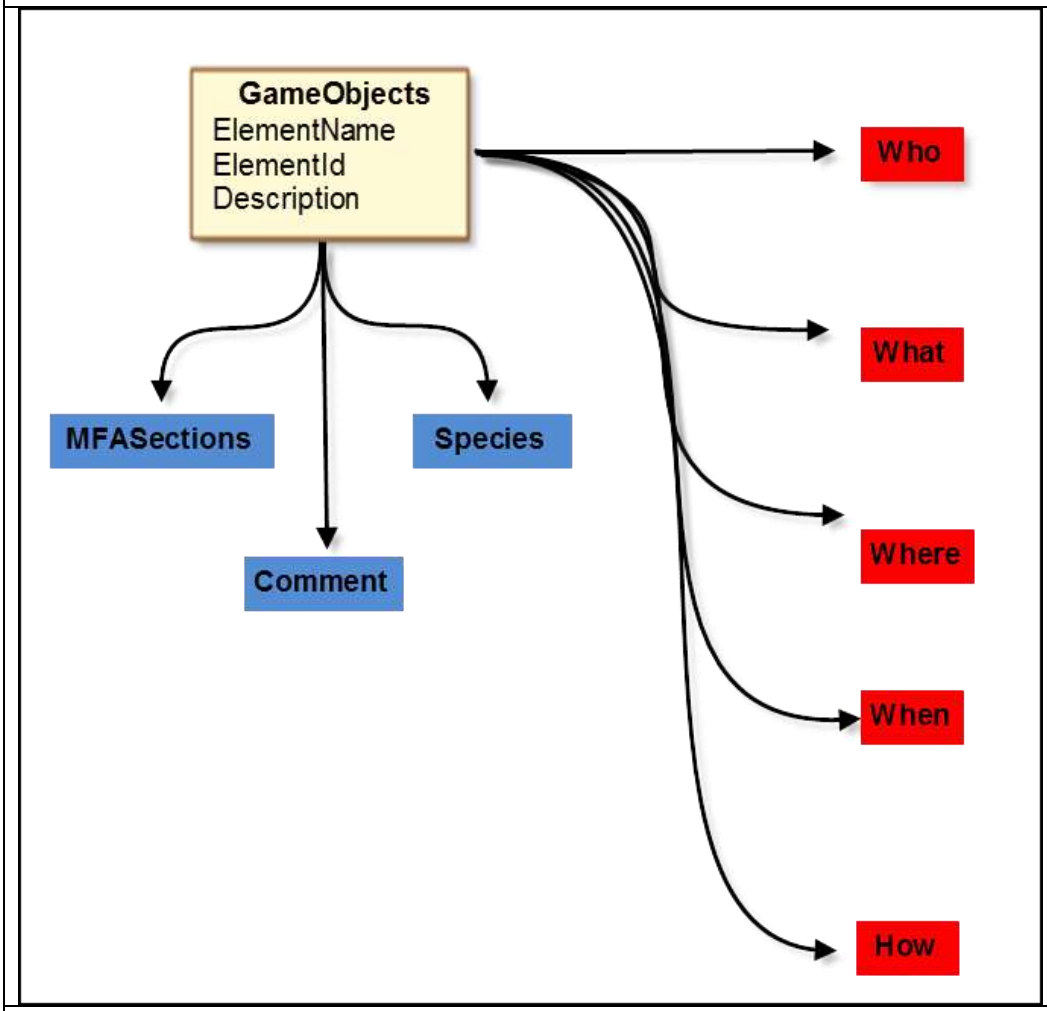


Figure 2: 'GameObjects' Table—Why a 'GameObject' is any person, place, thing, or action and why this 'ad-hoc design' works.

The 'GameObjects' Table is the hub for the Game Planning Database. It's going to allow Game Planning Officials to record information and relate it back to 'ad-hoc places and events'. The 'ad-hoc' idea embraces the requirement for staff to record and maintain re-useable information, to quickly respond to critical events, allow for the exploration of opportunities, and adapt to the needs of the agencies employees.

The database schema allows AZGD employees to save and add Contacts, draw polygon boundaries, apply dates and frequencies, and assign the associated actions. There are very few requirements of an Element in the 'GameObjects' Table; an Element does not need each Who, What, Where, When, and How completed. One Elements Who or Where can be associated with another Elements Who or Where.

Users will more easily be able to collaborate and share information across problem domains. The database schema is generic and cliché by capturing the 'Who, What, Where, Why, and How' of AZGFD staff—but because information is broken down into its data part that same information can be built up and re-used to make ever more complex information. Information large or small can effortlessly be added, shared, commented on, and analyzed.

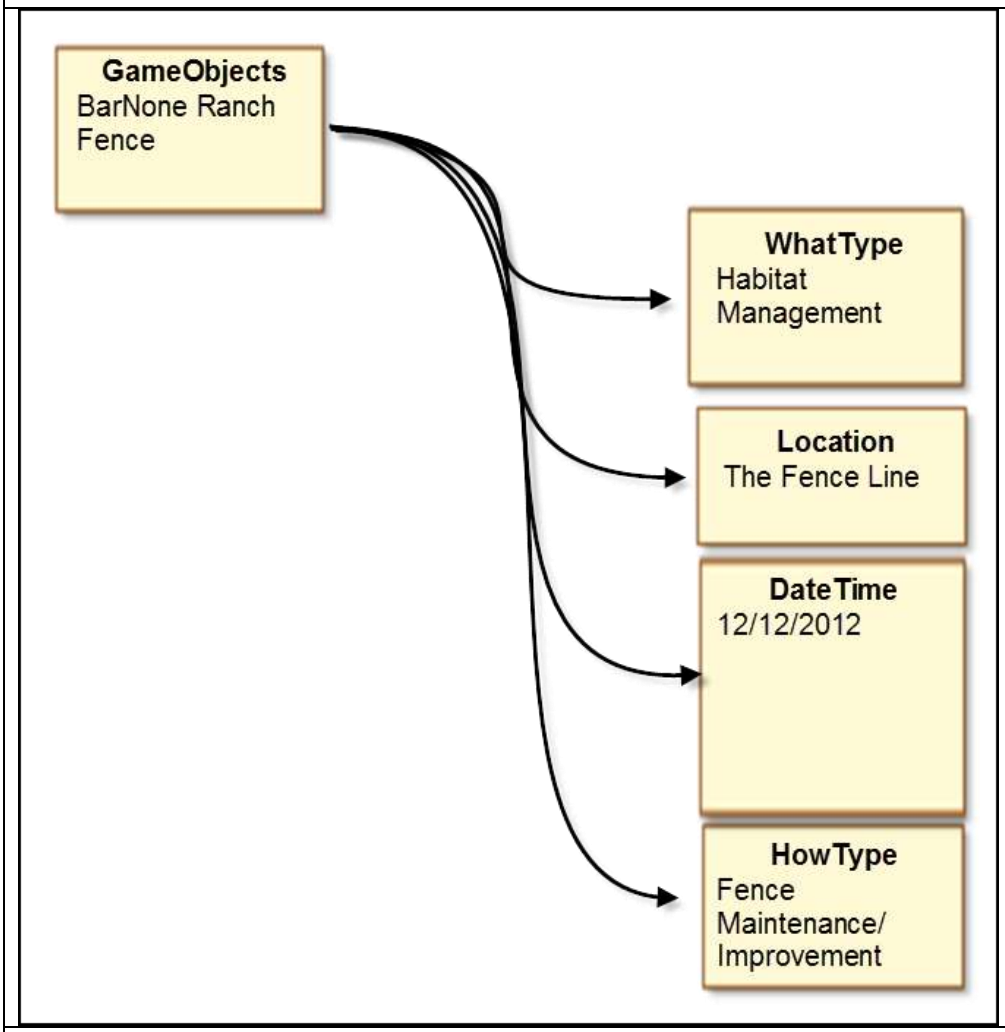


Examples of 'ad-hoc' utility for this database includes: relating a Management Focus Area to a Species, or a break out of a disease to a species and then to an MFA and the time of the year it occurs with the highest

frequency, or a seasonal event that is attended by Game Planning Officials and who to contact. See more examples below.

Figure 3: Example—Fence Project

This is a simple example of someone who was working on the 'BarNone Ranch Fence' and then recorded the Date and line on the map.

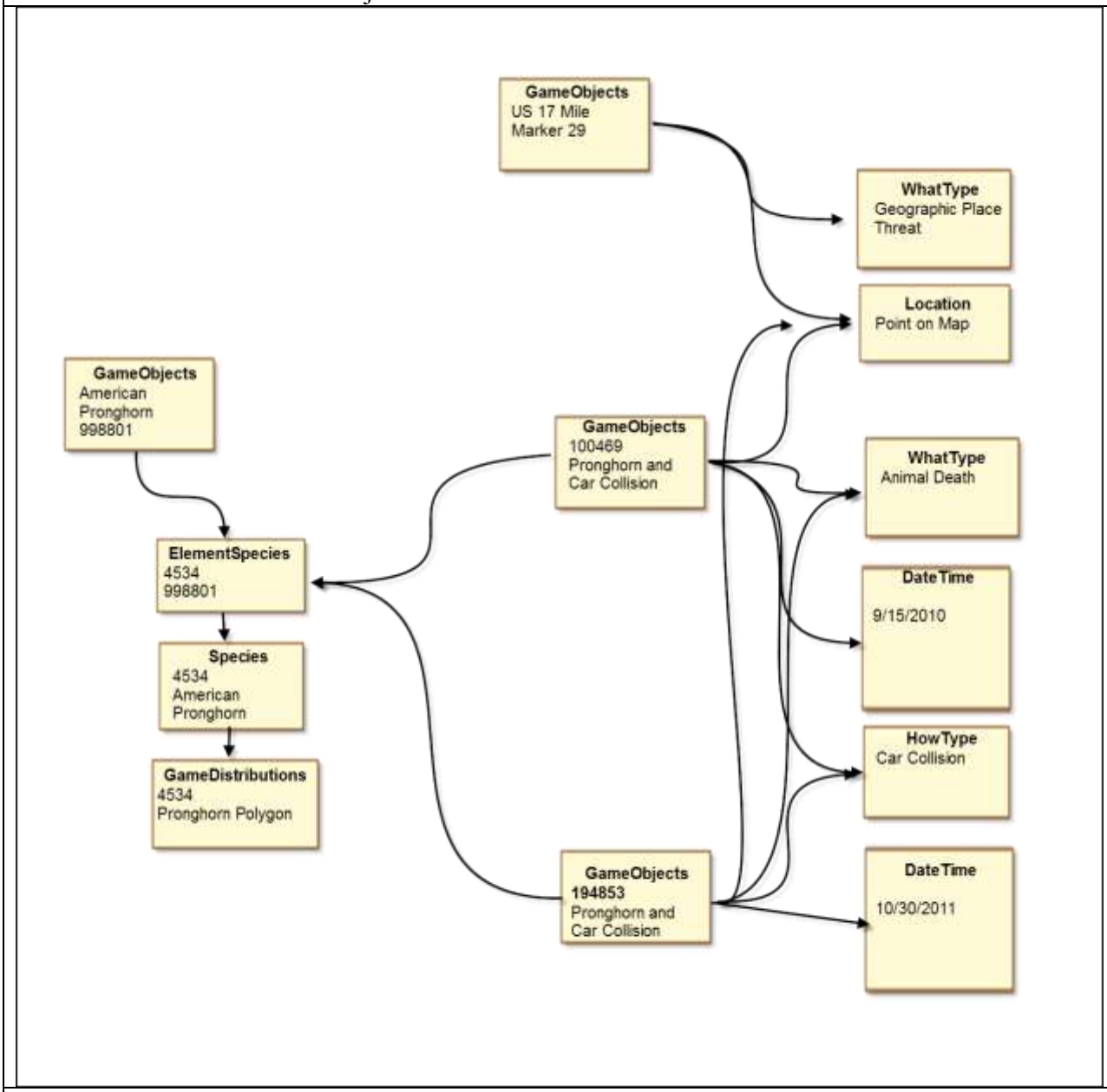


2 Examples of data re-use include: Data from these records can be viewed on 'GPT Data Map' with other records or listed as a 'Habitat Management Project' in the MFA that it resides in.

Figure 4 : Example—Car Collisions and Species

This is a more complex example of how a many users over time can link an Animal Species to 2 different car collisions mile marker 29.

Here's an example: The Point on the Map for the Mile Marker was drawn during the first car collision. Then another user enters a second collision, the 'WhatType', 'HowType', and 'Location, records were already created—so the second user adds another' GameObject' Element, gives it a name, pointed to these already occurring values, but with a different date and time. Someone decided to give the mile marker a name and description—a Geographic Place and a threat.
In the end there are 4 'GameObject' Elements.

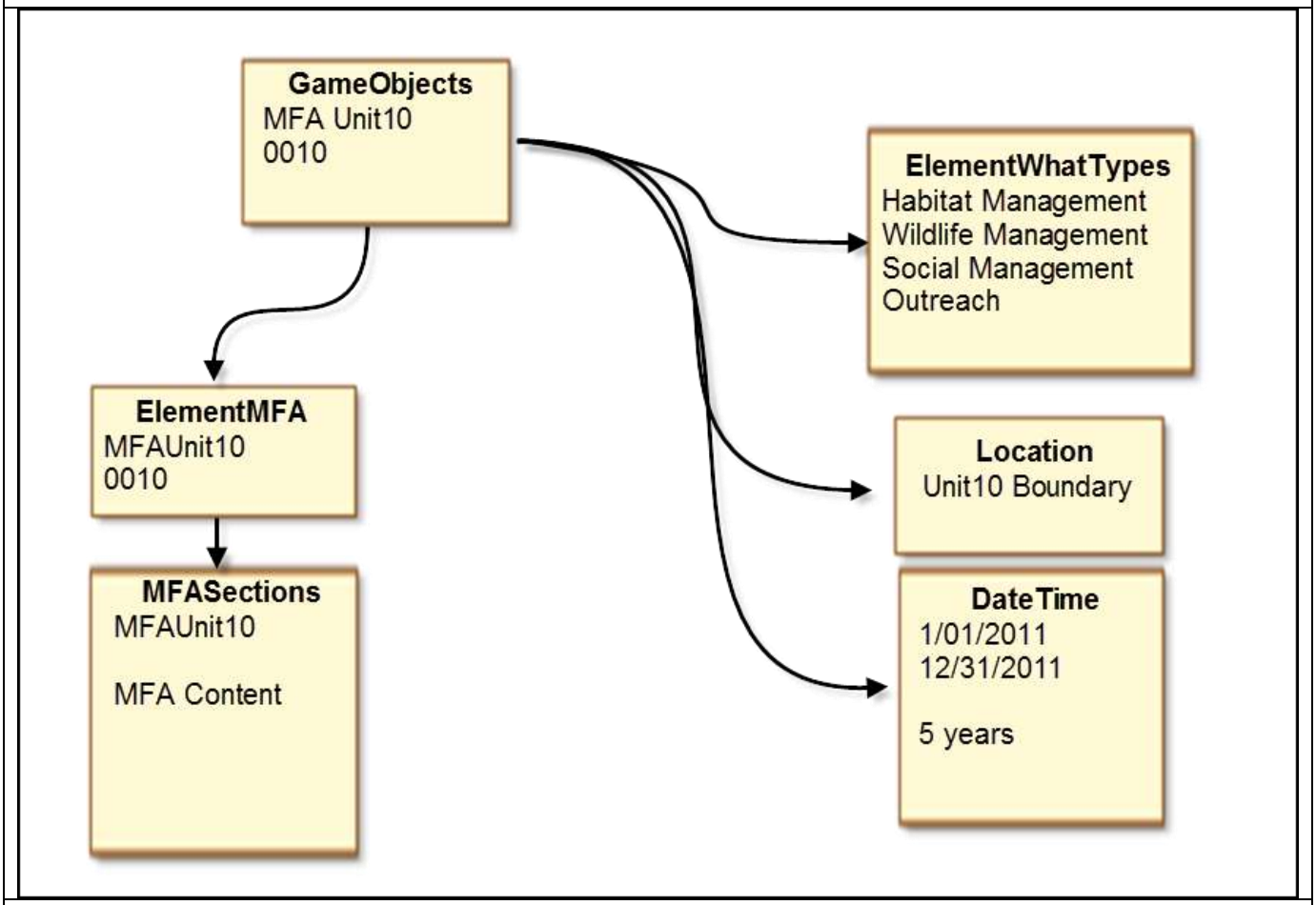


Information can now be retrieved from any part of the tree above. For example, if a user wanted a list of all 'Animal Deaths' recorded, or all records in the year 2011, or see more information about the 'American Pronghorn', or find out what's happening at the Mile Marker. Using the database and web application, the

user can drill up and down into the data.

Figure 5: Example—Creation of an MFA

This example shows how an MFA is just like any other person, place, thing, or action. The 'GameObject' table element is given an object name, joined with the Unit10 Boundary, given an annual date span, and duration of 5 years. The 'MFASections' were also linked to the boundary of unit 10.



Instead of the Unit10 Boundary as the location, the user can digitize one or more point, line, or polygon 'Location' recorods—using the 'GPT Data Map'.

Web Application:

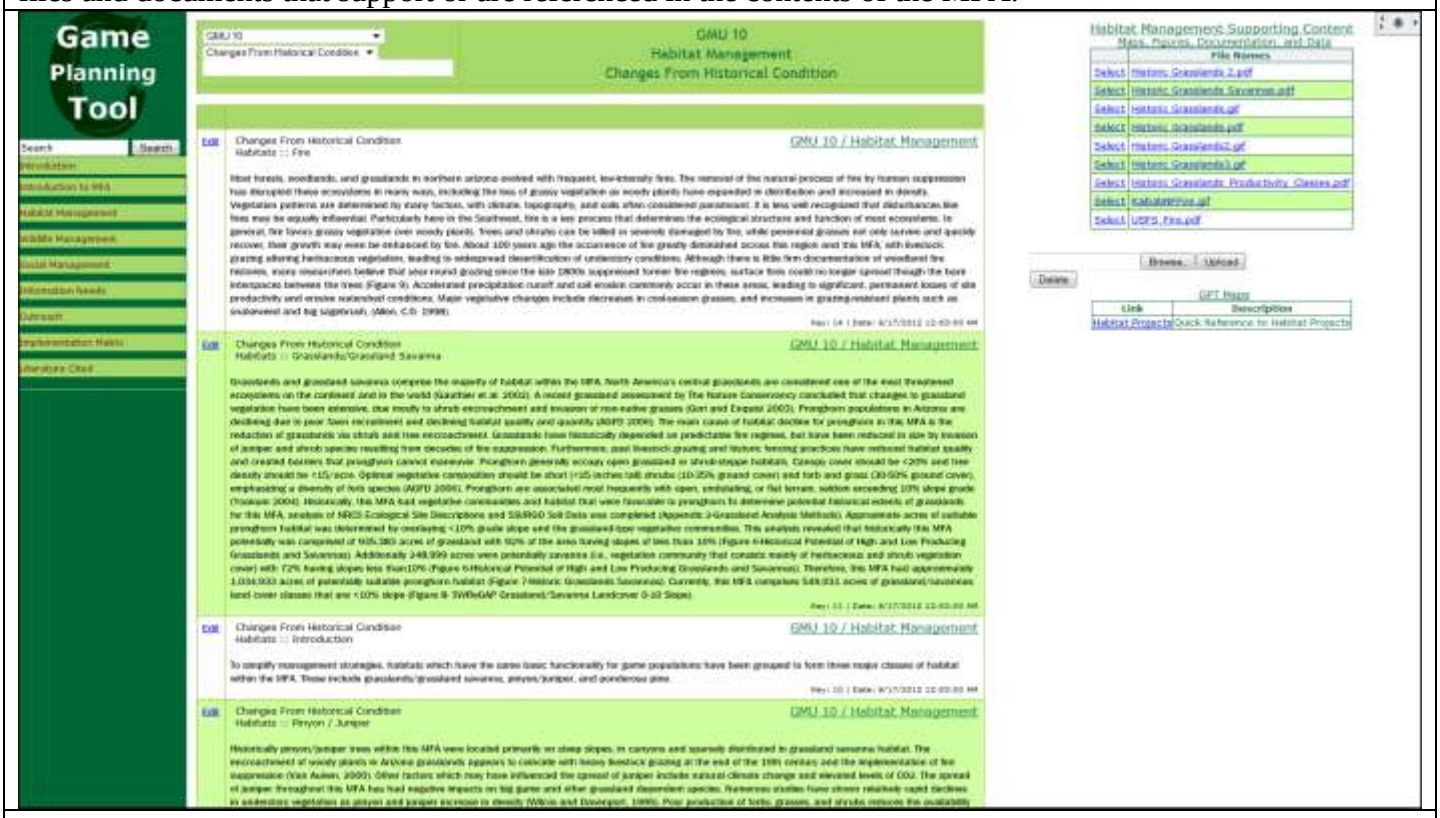
For the most part, the design and build of the CGMPT will be little more than a re-hashing of previous AZGFD web application developments. The GPT web application already has the ability to view and edit the 'MFASections' records of the 'GamePlan' Database (see figure below); I propose to meet the need of providing read and write web access to the tables described above. Users will be able to access the information in four ways (Tools: A,C):

1) The textual information that comprises an MFA will be available in a way that is similar to what can be found currently—a unique view of the MFA records on the CGMPT Website.

2) The addition of a unique web details view of the species managed in the MFA's—it is unique because, among other reasons, the species pages will have a link to the species management guidelines and regulations.
3) The Support content that can be found in the 'GameObject' tables will be listed as links to the right of the MFA content (simiular to how the CGMPT Website displays information now).
4) The Support content of the GameObject tables will also be available as a web form view. A web form view can display the information in the tables and also allow the data to be created and edited.

Figure 6: CGMPT Website with a view of an MFA record.

Unique views of sets of data are used to make sense of the information in the 'GamePlan' database. The view below shows the contents of an MFA and all of its sections. This view also has a list, on the right hand side, of files and documents that support or are referenced in the contents of the MFA.



In this unique view of an MFA, the user can upload, download, and delete supporting content of an MFA. The user can also edit the text of each MFA section.

CGMPT Website and the proposed create, read, update, and delete view of a 'GameObject'.

The webpage that will be used to make a unique view of each 'GameObject' will answer the 'Who, What, Where, When, and How' of each record. The text on the CGMPT Website will display information about each 'GameObject' record and will be displayed as a hyperlink—so similar data can be browsed and referenced from other data views. On a web page, the concept of linking records to other records, so that the user can pursue more related information, can be called 'drill down'.

To view all the records associated with a 'GameElement', the CGMPT Website will look query the database by the 'ElementId'.
ID: id number of GameObject record
DESCRIPTION: text description that describes the record.

WHAT IS HAPPENING: hyperlink list of all available tags that describe the record--optional HOW IS IT HAPPENING: hyperlink list of all available tags that describe the action of the record.--optional WHEN IS IT HAPPEING: hyperlink list of all available dates that are related to the record—optional WHERE IS IT HAPPENING: hyperlink list of all available locations where the record can be found—optional WHO IS INVOLVED: hyperlink list of a all available contacts involved in the record.--optional WHAT ARE PEOPLE SAYING: hyperlink list of all available comments about the record.--optional WHICH MFA's: hyperlink list of all MFA's that intersect with the --optional WHICH Species:: hyperlink list of all Game Species that intersect with record--optional
In this unique view of a 'GameObject' the user can read, and link to data. The user can also enter information into forms, or find information that is related to the current 'GameObject' in the view by selecting pre-existing data from dropdown menus.

CGMPT Website and the proposed create, read, update, and delete view of 'Species' data. The webpage that will be used to make a unique view of each record in the 'Species' table. This page will query the species information by the same unique species Id found in the Heritage Database Management System.
To view all the records associated with a 'GameElement', the CGMPT Website will look query the database by the 'ElementId'. AnimalId Description Common and Scientific Name Link to its Boundary on the 'GPT DataMap'. Links to all the files and documents stored on the web server—such as species plans and guidelines.
In this unique view of a 'GameObject' the user can read, and link to data. The user can also enter information into forms, or find information that is related to the current 'GameObject' in the view by selecting pre-existing data from dropdown menus.